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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,354	09/10/2003	Stephen F. Yates	H0004293	5140

7590 12/21/2007

Honeywell International, Inc.
Law Dept. AB2
P.O. Box 2245
Morristown, NJ 07962-9806

EXAMINER
CONLEY, SEAN EVERETT

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
12/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/660,354	YATES ET AL.	
	Examiner	Art Unit	
	Sean E. Conley	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,9-13,15-19,26-32,64 and 65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 7, 9-13, 15-19, 26-32, 64 and 65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL ACTION

Response to Amendment

1. The amendment filed October 10, 2007 has been received and considered for examination. Claims 1-4, 7, 9-13, 15-19, 26-32 and 64-65 are pending. The rejections of claims 17, 28, 32 and 64 under 35 U.S.C. 112, 2nd paragraph are withdrawn in response to the amendment which corrects the lack of antecedent basis or indefinite limitations cited in the previous action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-4, 7, 9-13, 15-19 and 64-65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, claim 1 recites "wherein the second photocatalytic oxidation unit is contiguous with the interior air space". This limitation is not supported by the applicant's specification and therefore does not comply with the written description requirement and is considered to be new matter. Claims 2-4, 7, 9-13, 15-19 and 64-65

are also rejected since they depend from and include all of the limitations of independent claim 1.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 27-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 recites the limitation "said second adsorbent unit" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim

Claim 28 recites the limitation "said first photocatalytic oxidation unit" and "said second photocatalytic oxidation unit" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim 29 recites the limitation "said first adsorbent unit" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1-4, 13, 15-19 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. (U.S. Patent No. 6,063,343).

Regarding claims 1 and 15, Say et al. disclose an air treatment unit for removing a pollutant from an air stream which is further capable of providing cleansed air to an interior air space.

The system of Say et al. comprises at least one air cleaner unit (reactor (100)) in communication with said interior air space, wherein said at least one air cleaner unit provides only a single flow path for said air stream using blower (118). Blower (118) is used to facilitate unidirectional air flow in the direction of the arrows in figure 5. The at least one air cleaner unit comprises a first photocatalytic oxidation unit (formed by photocatalytic fins (102)) and a first adsorbent unit (adsorbent buffer (not shown) positioned in the fluid stream before fins (102) with lamps (104) – see col. 7, lines 32-55), and furthermore said first photocatalytic oxidation unit is located downstream from said first adsorbent unit (see figure 5; see col. 3, lines 38-65; see col. 7, lines 12-55).

Say et al. also disclose that the air cleaner unit comprises a second adsorbent unit (post-filter (122)) comprising an adsorbent bed, said first photocatalytic oxidation unit (formed by photocatalytic fins (102) with lamps (104)) is located downstream from said first adsorbent unit, and said second adsorbent unit (122) is located downstream from said first photocatalytic oxidation unit (see figure 5; see col. 7, lines 25-31). The first adsorbent unit is adapted to reversibly adsorb said pollutant from said air stream at a first concentration of said pollutant and said first adsorbent unit is further adapted to desorb said pollutant into said air stream at a second concentration of said pollutant, and said second adsorbent (122) unit is capable of irreversibly adsorbing said pollutant from said air stream (see col. 7, lines 25-55).

Say et al. additionally disclose that the air cleaner unit (reactor (100)) is formed as a modular subassembly and adapted to connect to other sub assemblies to form a larger reactor. The use of subassemblies, each containing a reactor (100) or a portion of reactor (100)) may be interconnected in series or parallel (see col. 8, lines 12-20).

Therefore, since Say et al. discloses that the air cleaner unit may include additional portions of the air cleaner unit (reactor (100)) connected in series, it would have been obvious to one of ordinary kill in the art at the time the invention was made to include a second photocatalytic oxidation unit which is located downstream from the second adsorbent unit (post-filter (122)) in order to further treat the air stream as desired. Furthermore, the second photocatalytic unit is capable of being located contiguous with the interior air space.

Regarding claims 2 and 3, Say et al. disclose that the first photocatalytic unit (formed by photocatalytic fins (102) with lamps (104)) is physically separated from and located downstream from the first adsorbent unit (not shown but disclosed as being positioned upstream before fins (102) – see col. 7, lines 32-55).

Regarding claim 4, Say et al. disclose that the first absorbent unit is adapted to reversibly adsorb said pollutant from said air stream at a first concentration of said pollutant, and said first adsorbent unit is further adapted to desorbs said pollutant into said air stream at a second concentration of said pollutant (see col. 7, lines 32-55).

Regarding claim 13, the air cleaner unit (reactor (100)) is capable of being used in combination with the interior air space within an aircraft.

Regarding claim 16, Say et al. disclose an air cleaner unit (100) that is capable of continuously providing a stream of cleansed air to a location downstream o the air cleaner unit (see figure 5; see col. 7, lines 12-18).

Regarding claim 17, Say et al. disclose a particulate filter (pre-filter (120)) located upstream from the photocatalytic oxidation unit (formed by fins (102) and lamp (104)) and the adsorbent filter (122) (see figure 5; see col. 7, lines 12-25).

Regarding claims 18 and 19, the air cleaner unit of Say et al. is capable of operating at a constant temperature and at ambient temperature. Say et al. does not disclose any requirements on a specific operating temperature.

Regarding claim 64, Say et al. disclose that the first photocatalytic oxidation unit comprises at least one photocatalytic panel (fin (102)) and an ultraviolet source (104), wherein the fin (102) comprises a metal photocatalytic support and a photocatalyst (see col. 3, lines 50-65; see col. 6, lines 25-28).

8. Claims 7 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. as applied to claim 1 above, and further in view of the Applicant's Admission.

Say et al. fails to specifically disclose the isotherm curves of the adsorbent materials of the first and second adsorbent and also fails to specifically disclose the size of the micropores of the adsorbent material or an absorbent material that is activated carbon fabric.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Say et al. and use any suitable material having a specific isotherm curve, specific pore size, or a specific material type for the first and second adsorbent unit since the Applicant has admitted that selecting the appropriate adsorbent material for an adsorbent unit is a matter of design choice (see specification page 21, lines 12-30).

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. as applied to claim 1 above, and further in view of Ogata et al. (U.S. Patent No. 6,531,100 B1).

Say et al. disclose that the photocatalytic oxidation unit comprises at least one photocatalytic panel (fin (102)), wherein the fin (102) comprises a metal photocatalytic support (see col. 3, lines 50-65). However, Say et al. is silent with regards to specific types of metal used for the photocatalytic support, therefore, it would have been necessary and thus obvious to look to the prior art for conventional metal materials. Ogata et al. provides this conventional teaching showing that it is known in the art to use aluminum substrate as the support material for a photocatalyst (see col. 2, lines 52-65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the metal photocatalytic support from aluminum motivated by the expectation of successfully practicing the invention of Say et al.

10. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. as applied to claim 1 above.

Say et al. discloses the claimed invention in the embodiment as shown in figure 5 and disclosed in col. 3, lines 38-65 and col. 7, lines 12-55. However, this embodiment of Say et al. fails to disclose the configuration of lamps and photocatalytic panels as recited in claim 65. However, an alternative embodiment of Say et al., shown in figure 9, discloses a photocatalytic oxidation unit (formed by fins (502) and lamps (504) in reactor (500)) comprising a plurality of photocatalytic panels (fins (502)) and a plurality of ultraviolet sources (lamps (504)), wherein the panels and ultraviolet sources are arranged linearly and parallel to each other in an alternating setup (see figure 9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the photocatalytic oxidation unit of figure 5 with the photocatalytic oxidation unit of figure 9 based on the suitability and desired characteristics of the arrangement. Furthermore, substitution of known functionally equivalent structures involves only ordinary skill in the art and the courts have held that when a patent teaches a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result. KSR v. Teleflex

11. Claims 26-28 and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mirowsky et al. (U.S. Patent Application Publication US 2003/0150222 A1) in view of Say et al.

Mirowsky et al. disclose an air treatment system for airplanes to eliminate or substantially reduce airborne contaminant and odor problems. The system comprises: an environmental conditioning system "ECS" (213) for heating, cooling, and compressing the air and an air circulation system with ductwork in communication with the interior air space of the cabin. The environmental conditioning system (213) also functions as a mix manifold in that it combines the air from the intake unit with the air from the cabin (see figure 1). The cabin (203) has a vent (207) connected to ingress ductwork (205), which removes air from the cabin via blowers (21) into the environmental conditioning system (213). After the intake air is conditioned at component (213) it passes through egress ductwork (243) and vent (209) in the cabin ceiling (211). The egress ductwork (243) further includes a plurality of ionic oxygen generators (319, 321, 323, 325) which destroy contaminants in the air (see figure 1; see paragraphs [0034]-[0037]). The ionic oxygen generators are located downstream from the environmental conditioning system (213) and between an air intake unit (location where the outside air comes in at filter (37)) and the cabin (see figure 1). Furthermore, it is well known that the flight deck is the upper most part of the cabin in airplanes and thus the air space of the cabin also represents the air space of the flight deck. Mirokowsky et al. fails to disclose the air cleaning unit as recited in Applicant's present claim 26.

Say et al. disclose an air treatment unit for removing a pollutant from an air stream and which is further capable of providing cleansed air to an interior air space. The system comprises at least one air cleaner unit (reactor (100)) in communication

with said interior air space, wherein said at least one air cleaner unit has a housing (reactor chamber (106)) and provides only a single flow path for said air stream using blower (118). A blower (118) is used to facilitate unidirectional air flow in the direction of the arrows in figure 5. The at least one air cleaner unit comprises a photocatalytic oxidation unit (formed by photocatalytic fins (102)) and an adsorbent unit (adsorbent buffer (not shown) positioned in the fluid stream before fins (102)– see col. 7, lines 32-55), and furthermore said photocatalytic oxidation unit is located downstream from said adsorbent unit (see figure 5; see col. 3, lines 38-65; see col. 7, lines 12-55). Say et al. also disclose that the air cleaner unit comprises a second adsorbent unit (post-filter (122)) comprising an adsorbent bed, wherein said second adsorbent unit (122) is located downstream from said first photocatalytic oxidation unit (see figure 5; see col. 7, lines 25-31). Furthermore, Say et al. disclose that the air cleaner unit (reactor (100)) is formed is a modular subassembly and adapted to connect to other sub assemblies to form a larger reactor. The use of subassemblies may be interconnected in series or parallel (see col. 8, lines 12-20). Thus, the subassemblies form a battery of air cleaner units. Furthermore, as exemplified by figures 1 and 5, the photocatalytic oxidation unit (formed by fins (102)) is orthogonal to the air flow (indicated by arrows). Specifically regarding claim 28, Say et al. disclose that each photocatalytic oxidation unit comprises at least one photocatalytic panel (fin (102)) and an ultraviolet source (104), wherein the fin (102) comprises a metal photocatalytic support and a photocatalyst (see col. 3, lines 50-65; see col. 6, lines 25-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the airplane air treatment system of Mirowsky et al. and substitute the ionic oxygen generator system with the air treatment unit of Say et al. in order to yield the predictable result of treating the contaminated air of the airplane. Furthermore, the courts have held that when a patent teaches a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result. KSR v. Teleflex.

12. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mirowsky et al. in view of Say et al. as applied to claim 26 above, and further in view of the Applicant's Admission.

Mirowsky et al. in view of Say et al. fail to specifically disclose the size of the micropores of the adsorbent material. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Mirowsky et al. in view of Say et al. and use any suitable material having a specific isotherm curve, specific pore size, or a specific material type for the first and second adsorbent unit since the Applicant has admitted that selecting the appropriate adsorbent material for an adsorbent unit is a matter of design choice (see specification page 21, lines 12-30).

Response to Arguments

13. Applicant's arguments filed October 10, 2007 have been fully considered but they are not persuasive.

The Applicant first argues on page 12 that Say et al. fails to disclose a photocatalytic unit on a downstream side of the second adsorbent unit. This argument is not persuasive. First, Say et al. discloses that the air cleaner unit (reactor (100) may be connected in series to additional components of the reactor (100) to form a larger reactor (larger air cleaner unit). These components of the reactor (100) include photocatalytic oxidation units and adsorbent units. Thus, it would have been obvious to one of ordinary skill in the art to further include a second catalytic oxidation in combination with the reactor (100) of Say et al. in order to enhance treatment of the air stream flowing therethrough by forming a larger reactor (see col. 8, lines 12-23 of Say et al.) .

The Applicant also argues on page 12 that Say et al. does not disclose a combination of purification elements in which the final element is a photocatalytic unit. This argument is not persuasive because it is not commensurate in scope with the claims. The claims are not limited to an air cleaner unit that contains a photocatalytic unit as the final element. Therefore, the claims do not exclude other arrangements.

The Applicant further argues on pages 12-13 that Say et al. fails to disclose a structure in which a final absorber unit may perform reversible adsorption. This argument is also not persuasive because it is not commensurate in scope with the

claims. The claims do not require a final absorber unit capable of perfoming a *reversible* adsorption.

On page 13, regarding claim 26, the Applicant argues the following:

"Claim 26 also defines a structure in which "[a] first adsorbent unit, [a] photocatalytic oxidation unit, and [a] second adsorbent unit [are] arranged within a housing, said housing defining a single flow path for an air stream said photocatalytic oxidation unit arranged orthogonal to said air stream. Such a structure is not disclosed in Say et al. Indeed Say et al. discloses a structure in which air flow is parallel to a photocatalytic unit. "

This argument is not persuasive. First the argument is not commensurate in scope with claim 26. Claim 26 does not include a second adsorbent unit. Secondly, as exemplified by figures 1 and 5 of Say et al., the air stream flows orthogonal to the phototcatalytic oxidation unit (formed by fins (102)) as required by the present claim 26 and not parallel as argued by the applicant.

Also on page 13, regarding claim 1, the Applicant argues the following:

"Furthermore, claim 1 defines that "[a] first adsorbent unit includ[es] a first adsorbent material having a first isotherm curve for [a] pollutant [and a] second adsorbent unit includ[es] a second adsorbent material having a second isotherm curve for said pollutant, steeper than said first isotherm curve". Say et al, does not teach or suggest use of multiple adsorbent materials with progressively steeper isotherm curves."

This argument is not persuasive because it is not commensurate in scope with claim 1. Claim 1 does not require specific materials having different isotherm curves, especially a second absorbent material with a steeper isotherm curve than the first absorbent material.

On page 14, the Applicant argues that the cited Applicant admissions (page 21, lines 12-30) against claims 7, 10-12 and 29 do not anticipate or suggest the principle of claim 7. This argument is not persuasive because claim 7 discloses different adsorbent materials with different properties and the specification clearly states that selecting different adsorbent materials is a simple matter of design choice. Thus it would have been obvious to select materials with the properties recited in claims 7, 10-12 and 29.

Ogata et al. has again been relied upon in the above rejection of claim 9 to disclose a photocatalytic panel that comprises expanded aluminum.

Mirowsky et al. has again been relied upon in the above rejection of claims 26-32 to only disclose that it is well known to incorporate air treatment units in an aircraft air duct system.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean E. Conley whose telephone number is 571-272-8414. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gladys Corcoran can be reached on 571-272-1214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SEC

December 19, 2007

GLADYS JP CORCORAN
SUPERVISORY PATENT EXAMINER